Lacrimal disorders in children

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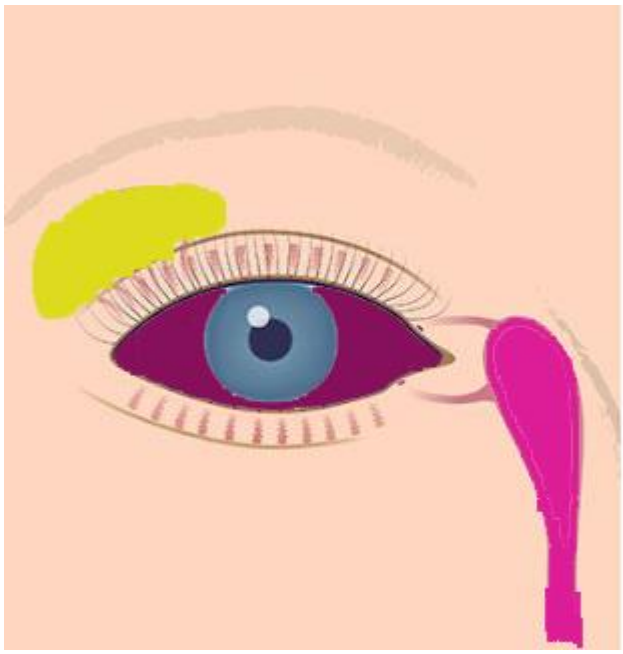


Otolaryngology Online

Introduction

Secretory portion is made up of lacrimal and accessory lacrimal glands. These glands together with the Meibomian glands and goblet cells secrete the components of the tear film.

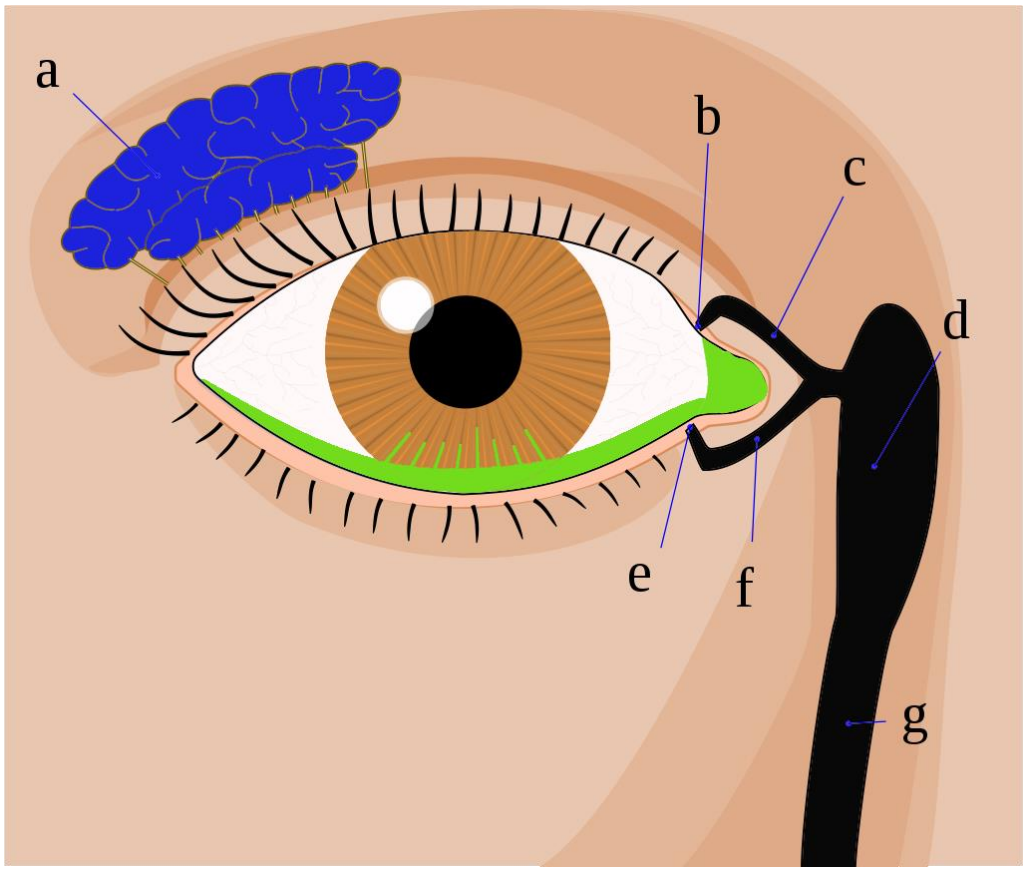
Lacrimal system consists of a secretory portion and a drainage system.

Lacrimal disorders in children

Drainage system consists of lacrimal puncta, canaliculi, lacrimal sac and nasolacrimal duct. This active system pumps tears from the conjunctival sac into the inferior meatus of the nose. Problems with the lacrimal system in children usually relates to the reduced drainage of tears. The underproduction of tears, causing dry eyes, is rare but serious due to the potential for sight threatening consequences.

The accessory lacrimal glands produce basal tear secretion, and the lacrimal gland is largely responsible for reflex tearing in response to noxious / emotional stimuli.

Anatomy



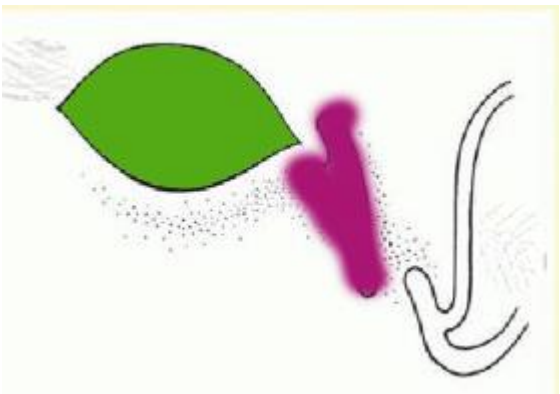
a = lacrimal gland
b = superior lacrimal punctum
c = superior lacrimal canal
d = lacrimal sac
e = inferior lacrimal punctum
f = inferior lacrimal canal
g = nasolacrimal canal

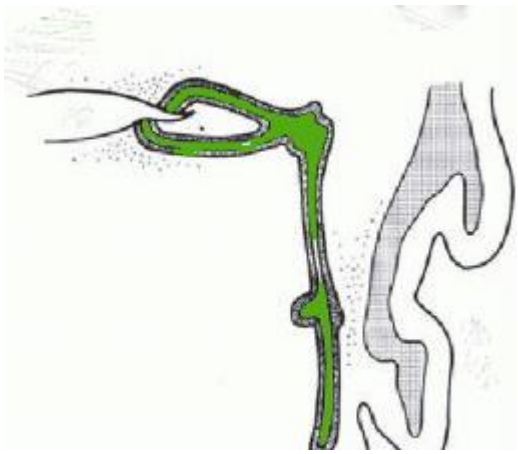
Anatomy (contd)

Lacrimal gland:
This is an exocrine gland that is located in the anterior aspect of the supratemporal orbit. The ducts of the gland open onto the conjunctiva in the superior fornix.

Embryologically the lacrimal gland develops from ectoderm that is supported by embryonic skull cap mesoderm. The lacrimal gland continues to grow up to the age of 4 years.

Basal tearing is present in infants from birth and reflex teraing begins at any time from birth to several months of age. The lacrimal outflow system develops between the embryonic maxillary process and the lateral nasal process from a cord of surface epithelium. This tissue begins to canalize by the end of first trimester. It opens into the inferior meatus of the nose just before or after term birth. There could be a cailure of this canalization process at any part of this system, but is most frequent at the lower end.





Tears are actively pumped through the outflow system from the puncta and canaliculi and into the lacrimal sac. This is situated in the bony lacrimal fossa, separated from the middle meatus of the nose by the maxilla and the lacrimal bone. The lacrimal sac extends superiorly under the medial canthal ligament as its fundus. The nasolacrimal duct exits from the lower end of the sac and passes in a downward, lateral and posterior direction.
The duct is surrounded by bone in its upper part but becomes membranous inferiorly and opens into the medial wall of the inferior meatus of the nose through Hasner's valve.

Causes of watery eyes in children

Excess tear production	*Drainage failure*
Allergic Rhinitis	Congenital nasolacrimal duct obstruction
URI	Skeletal & sinus abnormalities
Epiblepharon	Lid malposition
Subtarsal foreign body	
Corneal abrasion/ ulceration	Punctal malposition
Conjunctivitis	Punctal occlusion
Glaucoma	Anomalous drainage system

Dry Eyes in Children

On examination:
1. Reduced tear meniscus with punctate keratopathy affecting interpalpebral zone
2. Staining occurs with flurescein dye

Irritable
Gritty eyes
Eyes diffusely injected

Treatment:

Copious use of artificial tears

Congenital alacrimia is rare. Could occur due to absence of lacrimal gland / due to lacrimal gland being ectopic.

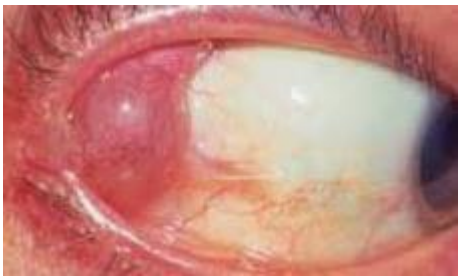
Allgrove syndrome:
Familial alacrimia
Achalasia cardia
Glucocorticoid deficiency
Anhydrotic ectodermal dysplasia
Riley-Day syndrome (familial dysautonomia)

Acquired tear deficiency:
Damage to lacrimal gland by EB virus (as a result of HIV),
Sjogren syndrome (rare in children)
Isotretinoin treatment for acne can cause dry eyes in adolescence
Conjunctival damage causing ductal obstruction

Lacrimal tumors & Granulomas

Malignant epithelial tumors:
Mixed cell adenocystic and other carcinomas

Lacrimal tumors are very rare in children.
Orbital pseudotumor can cause painful swelling. It occurs due to inflammation and could affect lacrimal gland.
This condition is noninfective and responds to steroids.

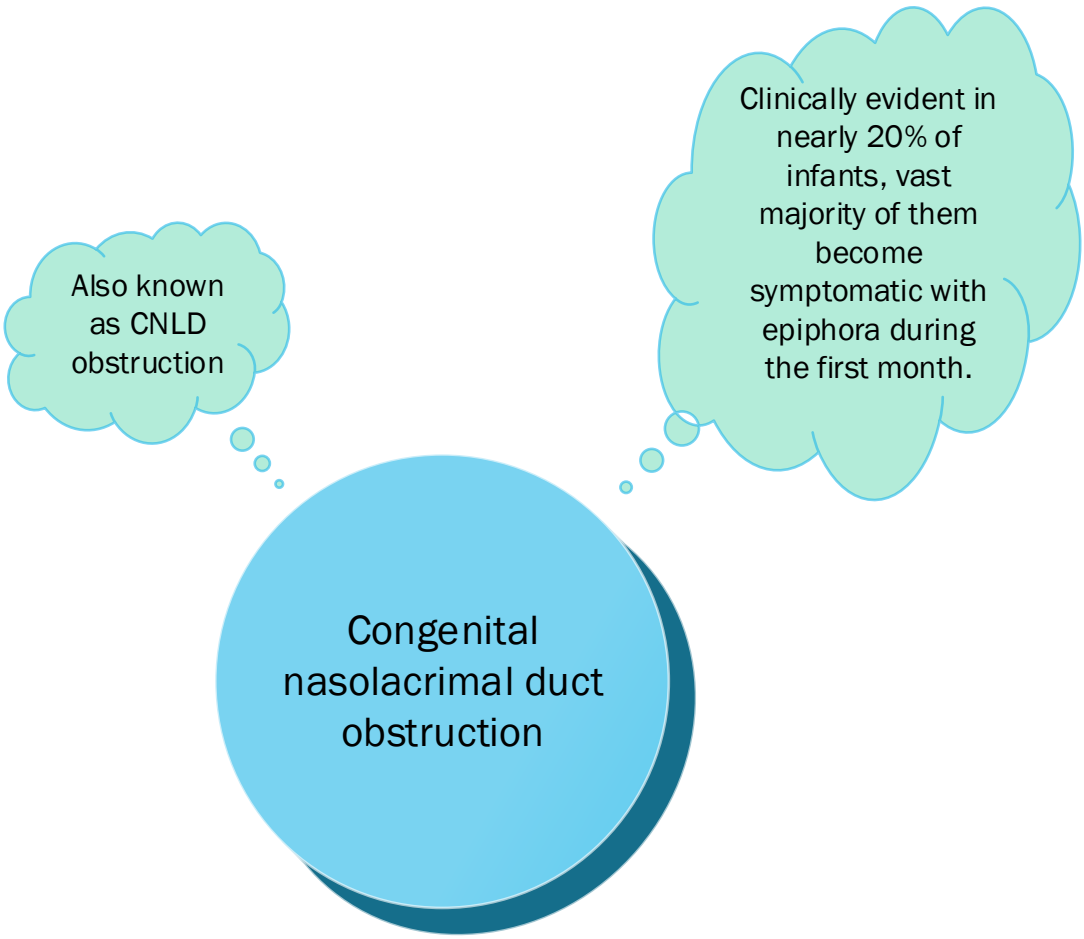


Dacryocystocele is a congenital swelling located at the medial canthus due to trapped fluid inside the lacrimal sac and nasolacrimal duct. This presents as a tense, blue, non pulsatile swelling below the medial canthus. It is seen at birth. This condition should be differentiated from meningoencephalocele, meningocele, a midline nasal dermoid cyst or capillary hemangioma. MRI scan helps in the differential diagnosis.

Dacrycystocele can be observed during the first 2 weeks of life during which time most of these children recover spontaneously.

Lacrimal gland enlargement is found in sarcoidosis and leukaemia.
Bilateral prolpase of lacrimal gland is seen as subconjunctival mass in the upper outer fornix.
This occurs with craniofacial anomalies due to reduced orbital volume and increased orbital pressure.

Congenital Nasolacrimal duct Obstruction



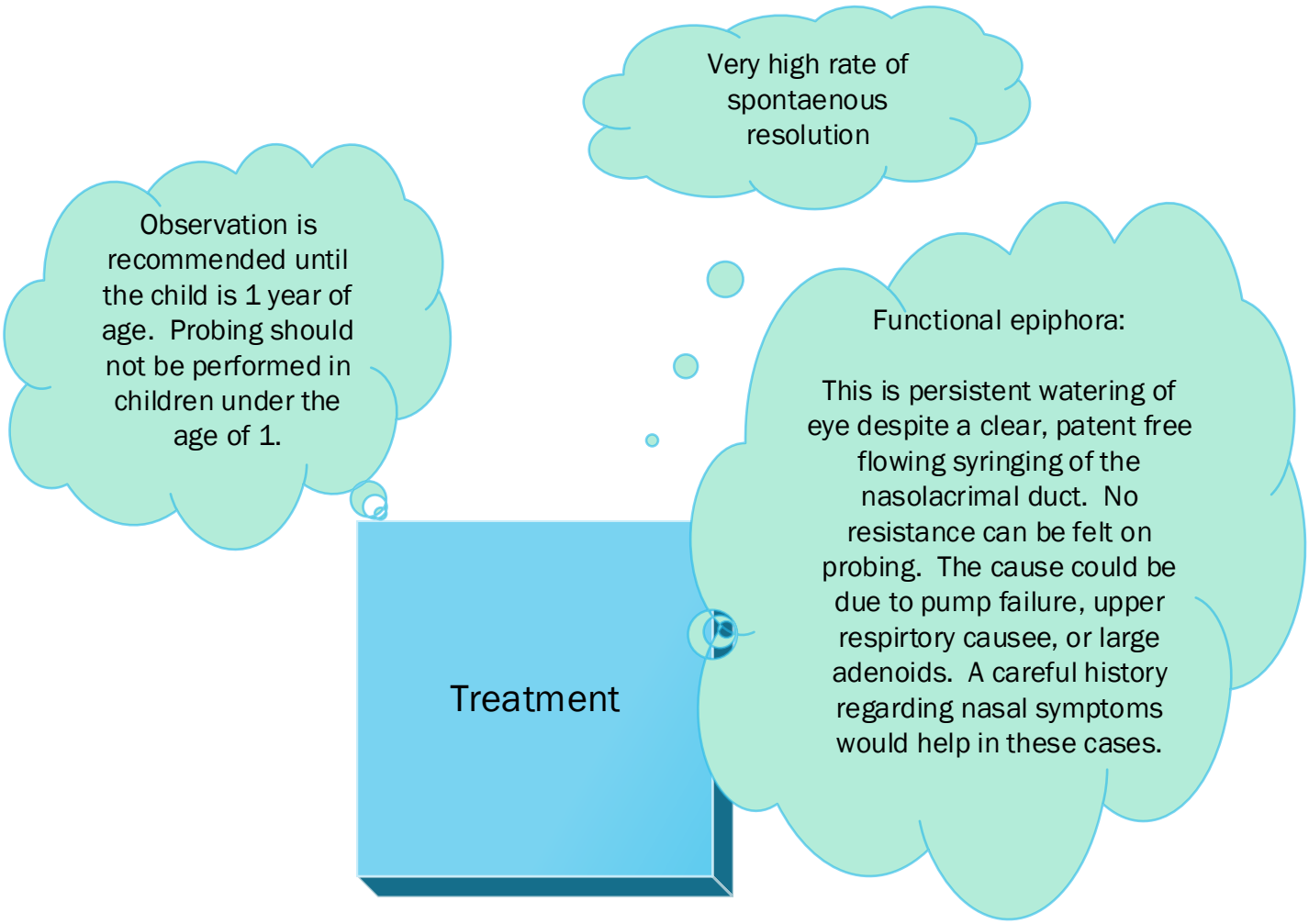
These children resolve spontaneously with maturation. Spontaneous resolution is rapid during the first year of life and continues at a reduced rate, into childhood.

This condition represents a delay in maturation of the lacrimal drainage system, resulting in persistent membranous obstruction / stenosis at the level at the valve of Hasner. This condition should be differentiated from a dacryocystocele.

This condition is seen in EEC syndrome (ectrodactyly, ectodermal dysplasia, clefting) branchio-oculo facial syndrome, Down's syndrome, LADD syndrome, and CHARGE association.

Fluorescein disappearance test should be performed on children with epiphora as it provides objective evidence to support a diagnosis of lacrimal outflow obstruction.

CNLD Obstruction Management



Probing should be carried out in a stepwise pattern.

First stage:

This stage in probing is a blind procedure and it depends on the awareness of resistance to the probe as it passes through the system.

Second stage:

A 2.7 mm nasal endoscope can be used to have a direct view of lower end of nasolacrimal duct. The inferior meatus can be opened up using a Freer's elevator. This manoeuvre is therapeutic as it opens up a narrow inferior meatus as it would stretch a stenotic ostium.

Third stage:

The appearance of fluorescein dye can be checked by syringing the punctum. The drainage can be visualized using a nasal endoscope.

Fourth stage:

The lacrimal drainage system should then be probed via the upper canaliculus using the smallest Bowman's probe available. The probe can be visualized in the inferior meatus with the help of nasal endoscope. False probing can miss the Hasner's valve altogether. If the distal bony duct is atretic then endoscopic dacryocysto rhinostomy is performed.

COMPLEX ABNORMALITIES OF THE OUTFLOW SYSTEM

Complex abnormalities of the canaliculi or the proximal nasolacrimal duct is a common cause of persistent epiphora in older children, as other simpler abnormalities settle spontaneously. These complex abnormalities are common in children with abnormal facial skeleton.

Endoscopic DCR can be carried out in these patients who don't respond to conservative management

Complex abnormalities of the outflow system:

Endoscopic probing will help in the diagnosis. This has the advantage of blind probing in that it can avoid the common causes of failed probing.

Intubation of the lacrimal drainage system using silicone tubes can also be tried out in these patients.

Congenital fistulae of the lacrimal outflow system

Fistula of lacrimal system are rare anomalies in which tracts open onto the skin directly from the puncta, canaliculi, lacrimal sac or nasolacrimal duct.
They usually pass unnoticed as they are non-functioning can can be left untreated unless tears flow through them.

Failure of the proximal end of the lacrimal drainage system to canalize may result in punctal stenosis or atresia. This is often asymptomatic, if only one punctum is abnormal.

Narrow puncta should be dilated with a Nettleship lacrimal dilator. Membranous obstruction should be pierced with a needle and dilated.

Acquired conditions of the lacrimal drainage apparatus

Acquired nasolacrimal duct obstruction can be caused by facial trauma, diseases of nose and sinuses or persistent URI. These are more common in older children and adolescents. Rarely acquired obstruction could indicate fibrous dysplasia / tumor formation.

Acquired causes

Skin incisions should be avoided during acute phase as it could leave a permanent fistula. If pyocele develops then it can be decompressed using needle aspiration / emergency endo-dcr can be performed.

Acute dacryocystitis can occur as a complication in non-patent nasolacrimal systems / it can also occur as a primary event in a patent system. This is really common in infants with dacryocystocele.

Treatment:
Intravenous antibiotics should be immediatly administered to prevent retrobulbar abscess. Culture should be taken from secretions expressed via the punctum./
Probing should not be done as it can damage the congested epithelium creating a false passage. It could also lead to orbital cellulitis and fistula formation.